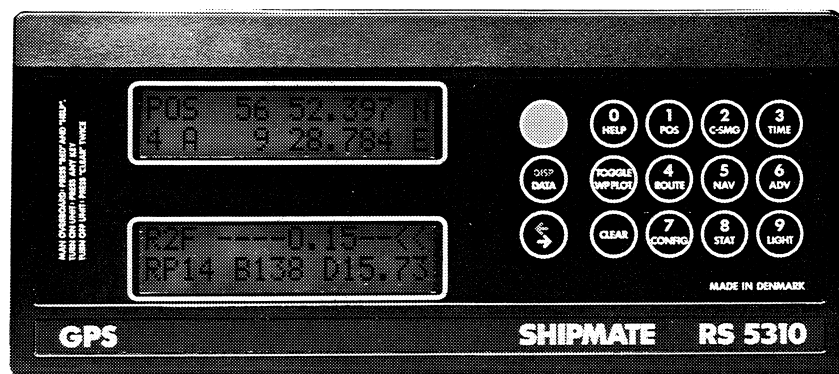


Navigator's manual

# SHIPMATE RS 5300 C

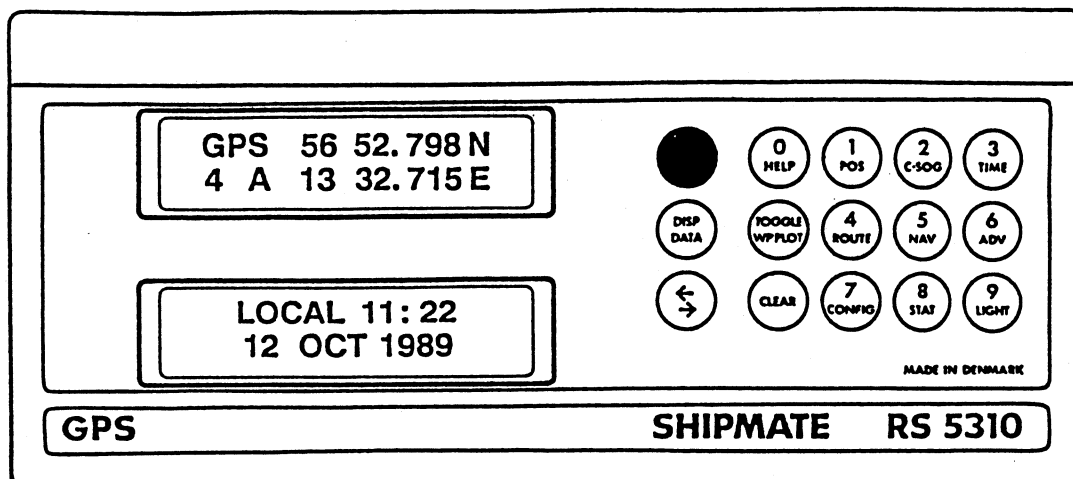
GPS  
Satellite  
Navigator





## Navigator's Manual

# RS5300C Shortform



## Display A and P

There are two displays; A the active display and P the passive display. When selecting a function from the keypad it will be reflected in the active display, which is recognized by a small line (cursor) under the first character. Display A and P can switch places by means of RED, DISP.

## HELP information

If in doubt about the application of a function, the meaning of a symbol or an abbreviation appearing in the display, - press HELP. Most of the functions are supported by user guidance, which will appear in display P. All of the HELP information may not fit into two lines, so continue to press HELP until reaching the end of the message, which is when the display returns to the original display.

## Selection of functions

To locate a certain function:

- First select the function group.
- Then press the arrow key until you see the right function.

If you pass the function by mistake, go back one step by pressing RED, ←

See overleaf for available function groups and the group members. The groups are:

POS, C-SOG, TIME, ROUTE, NAV, CONFIG, STAT, LIGHT, RED POS, RED C-SOG, RED TIME, RED ROUTE, RED NAV, RED CONFIG, RED STAT, RED LIGHT and RED RED 1 up till RED RED 9.

**Example 1:** Press POS and you'll get the position RS5300C uses in its calculations; and then, by pressing → you'll have the position in decca lanes, and by pressing → again, you'll have the name of the chain, if the chain has been selected.

**Example 2:** Press RED, POS and you'll get the GPS position. Then, by pressing → gives you the corrected position, which will not be the same as the GPS position providing a valid offset has been inserted. Repeat → to get the external position, if the system is set up to receive one. Repeat → to return to the GPS position.

## Starting up

If RS5300C has been switched off for more than 30 seconds it will always start up by doing a selftest when RS5310 is reactivated. The values shown as a result of the selftest are quite important to operation accuracy, and the operator should make a habit of checking them before continuing. To check points, press → to obtain the position ... check if its accurate within 150 km (otherwise, key in the correct position via DATA). Go through each object by repeating →. Any corrections made to position or time will make the navigator when reaching the final object of the check points start up from the beginning again. Last display in the start frequency is DATUM; the European datum is No. 01 and WGS 84 is No. 00.

## Inserting data

Insert data, such as position, alarm limits, etc. by pressing DATA, enter the new value, DATA.

If you change your mind before completing the entry, press CLEAR and nothing will be changed.

When activating DATA the first character ready to receive correction will be flashing. Point at the characters you wish to change by means of → and RED, ←.

Numerical data are keyed in from the numbers on the keypad. Any other data are selected by means of the TOGGLE key. When satisfied with the data in the display, complete the entry with DATA.

**Note!** When working with display A, display P will automatically provide helpful information to current activities.

## Man overboard (MOB)

If anybody should fall overboard, press RED, HELP and CLEAR to activate the MOB display.

All the navigator's other functions are still available during a MOB manoeuvre. If you have entered into other functions, press NAV to restore the MOB display.

To reset the MOB function, press DATA, TOGGLE and DATA whilst the MOB function is shown on the display.

# RS5300C Function overview

When the operation unit is passive (off) it is reactivated by the touch of a key (any key).

ADV——Advance to next waypoint in pilot function  
 LIGHT——Adjust display illumination  
 CLEAR, CLEAR——Turn off display, operation unit is passive  
 RED, LIGHT——Adjust display contrast

POS—Position  
     ├ Position converted to decca lanes  
     ├ └ Select decca chain  
     └ Name of decca chain and correction data when chain is selected

RED POS—GPS position  
         ├ DATA New start position  
             (New position causes restart)  
         ├ COR position  
         └ EXT position

C-SOG——Course and speed over ground  
         ├ Log and log date  
         └ DATA Reset of log counter

RED C-SOG—Estimated set and drift  
             ├ EXT heading and speed  
             └ Variation

ROUTE——Editing of route and waypoint functions  
         └ DATA Select route to be edited

RED ROUTE—Route calculator  
             └ DATA Select route, startpoint and speed

NAV——Pilot function  
         ├ DATA Activate/deactivate pilot function  
         ├ Approached waypoint / Anchor position  
         ├ Course and distance to subsequent waypoint  
         ├ Waypoint-alarm  
         ├ └ DATA Change alarm limit, activate/deactivate alarm.  
         ├ XTE-alarm  
         ├ └ DATA Change alarm limit, activate/deactivate alarm.  
         ├ Anchor-alarm  
         ├ └ DATA Change alarm limit, activate/deactivate alarm.

RED NAV—ETA function  
         ├ DATA Select destination waypoint and automatic/manual speed  
         ├ ASR function  
         ├ └ DATA Select destination waypoint and waytime

TIME——Local time and date  
         ├ DATA Inserting local time and date  
         ├ UTC  
         ├ └ DATA Inserting new UTC time  
             (New UTC causes restart)

RED TIME—Navigation period 1 + 2  
             ├ Navigation period 2 + 3  
             └ Navigation period n + (n + 1)

STAT with an almanac in the unit:

STAT——Navigation status  
         ├ Signal/noise  
         ├ Visible satellite 1  
         └ Visible satellite N

STAT without an almanac in the unit:

STAT——Navigation status  
         ├ Signal/noise  
         ├ First satellite to be searched  
         └ └ DATA Select satellite searched first

RED STAT—Health of satellites  
             ├ Exclusion of satellites  
             ├ └ DATA Manual exclusions  
             ├ Satellite fault level  
             ├ └ DATA Set fault level  
             ├ Satellite mask angle  
             ├ └ DATA Set mask angle  
             ├ HDOP limit  
             └ └ DATA Set limit

## CONFIG

├ POS—Datum  
         ├ Correction to position (DELTA-pos)  
         ├ Correction to decca lanes  
         ├ Max dead reckoning time  
         ├ Automatic/manual selection of ext pos  
         ├ Alarm limit of position uncertainty  
         ├ Antenna altitude  
         ├ C-SOG—Magnetic/true C-SOG & NAV  
                 ├ Automatic/manual set and drift  
                 ├ Averaging time of speed  
                 ├ Log and log date  
         ├ TIME—Date format  
                 ├ Local time  
                 ├ Min. number of satellites in a navigation period  
         ├ NAV—Rhumbline/great circle navigation  
                 ├ Waypoint alarm limit  
                 ├ XTE alarm limit  
                 ├ Anchor alarm limit  
                 ├ Time registration of waypoints  
         ├ STAT—Max. HDOP  
                 ├ Satellite mask angle  
                 ├ Manual exclusion of satellites  
                 ├ Fault level on satellites  
                 ├ Choice of language

(All CONFIG functions will respond on DATA)

RED CONFIG—Select protocol  
                 └ Select sentences



# SHIPMATE

**Part number: 183.2039.003**

This manual is a user guide for:

**SHIPMATE RS5300C GPS Navigator**  
**SHIPMATE RS5300B GPS Navigator**

- *Whenever the definition RS5300C is used in the manual it also applies to RS5300B.*

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## 1. Introduction and manual

---

Please read this page before you start to explore the manual.

### Introduction

SHIPMATE RS5300C GPS Navigator is a fully automatic satellite navigator which calculates the position by means of signals received from orbiting SU's (satellites).

The satellite system will be fully developed in 1990, and when that happens the GPS coverage will be available 24 hours a day anywhere on earth.

### How to use the manual

This manual is intended to get you acquainted as quickly and easily as possible with the many functions the GPS navigator has to offer.

The best way to start, is first of all to get to know the functions you'll be using the most and leave the rest for a later date when you will have become more familiar with the system. As you learn more you will find the RS5300C very easy to operate, as all the functions are organized into groups.

There is also the convenience of a HELP key. It will provide helpful information in relation to the function there is active at that moment.

A summary is preceding each chapter.

*Chapter 2* explains about key applications, how to get started. It has an overview of the function groups. The functions are also listed alphabetically, so you can quickly locate a function even if you don't know what group it belongs to.

*Chapter 3* provides data related to the position. The various ways a position is obtainable, course and speed over ground, set and drift and a section with details of how to work with local time and UTC time plus in which periods you can navigate on GPS.

*Chapter 4* provides data related to waypoints and routes, how they are created and how to use the pilot function on a planned route. There is also a description of how to set up the alarm system for waypoints and routes.

*Chapter 5.* Configuration is like a library for all the settings you have in the navigator. If you activate CONFIG and leaf through the various functions you'll find all the settings, say for alarms, position offset, sailing according to rhumbline or great circle navigation and much, much more. This is a special chapter that quickly can provide the user with an overall view of what is stored in the navigator's memory.

*Chapter 6* shows you how to install RS5300C and RS5310. Step by step instructions for how to use the mechanical parts for mounting. Data on inter-connection of external equipment.

*Chapter 7* tells you how to find out which satellites are currently used for navigational data and if they are healthy or not.

The two last sections deals with special functions and error codes, which you will not be needing under normal navigation.

An *index* has been created to give you a quick answer to a certain question.

We recommend that even though you have had a technician to install the navigator please go through chapter 6 and get your own impression of how the different things are connected and work together. Then you may continue with the chapters 2 and 3 and try out the functions.

*We wish you good luck and pleasant voyage!*

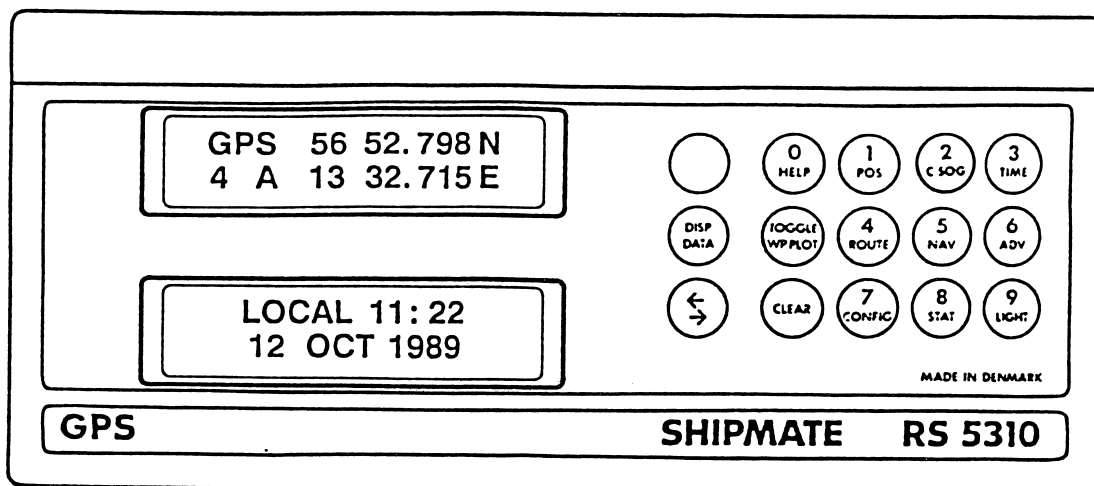
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## 2. General functions

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### 2.1 RS5310 keypad

There are 15 keys and some have more than one function.

The function of each key is written on the key and can be related directly to the function group.

Using the red key together with a function key gives access to extra functions.

The most used functions are described in chapter 3, while the rest are explained in the chapters to follow.

A few hints to keep in mind are →

**HELP**

Provides the user with helpful information of what to do in a given situation.

**TOGGLE**

Goes through the options available and toggles between on and off, etc.

**CLEAR**

Erases erroneous data entries.

**Exit from functions, etc.**

**LIGHT**

Adjusts the display light.

**RED, LIGHT**

Adjusts the display contrast.

**2xCLEAR**

Turns off the display. RS5310 can be revoked by the touch of a key.

### 2.2 How to start the navigator

- Press the green switch on RS5300 and wait for a few seconds.
- Press any key on RS5310's keypad.

*If RS5300C has been disconnected for more than 30 seconds the unit will always start up with a self-test followed by a start procedure. Some of the values in the start procedure will have great influence on the position accuracy, so it is to your own advantage to check and make sure they are correct.*

To check the values in the start phase:

- Press the arrow key

Your position will be shown in the display. Check if its correct within 150 km (approx. 80 nautical miles) If not, press DATA, enter correct position, DATA.

- Press the arrow key

UTC time will be shown. Check that the time is correct within 30 minutes. If not, press DATA, enter correct time, DATA.

- Press the arrow key

Antenna altitude will be shown in metres. It is very important that the altitude is absolutely correct. If not, press DATA, enter correct antenna altitude (the antennas height above sea-level), DATA.

- Press the arrow key

The datum will be shown. Check if its the right one. If not, press DATA, enter correct datum, DATA. *If a valid offset to the position has been inserted or a satellite warning has been deleted, this will also be shown here. These settings are made in CONFIG.*

- Press the arrow key

The navigator is ready to start navigating. The first display to come on will be the last one on before the unit was turned off.

*NOTE! If position or time were corrected during the start phase, the display will turn off and the navigator will have to go through the start procedure one more time, which will take another 5 seconds (approx.).*

### 2.3 RS5310 displays

RS5310 has four lines of information in two displays Display "A" is the active display and is recognized by a small line (cursor) under the first character. The data keyed in from the keypad goes in here Display "P" is the passive display and contains fixed data, such as HELP information, and is related to the data in display "A".

The displays can be switched around by pressing RED, DISP.

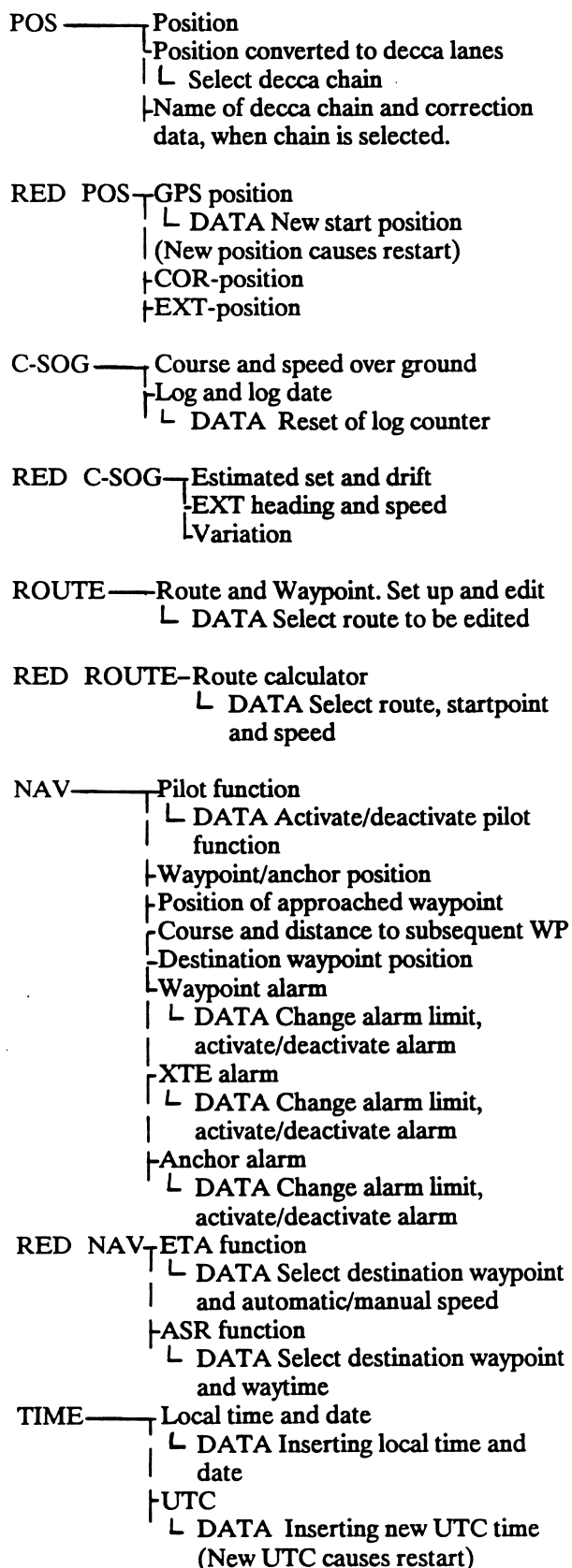
### 2.4 How to select the functions

The navigator's functions are organized into groups. When you want to select a function:

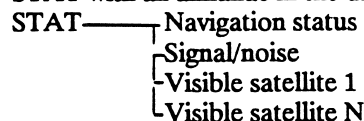
- Find the group the function belongs to.
- Press the arrow key until the function appears.

*The various function groups are listed on the next page.*

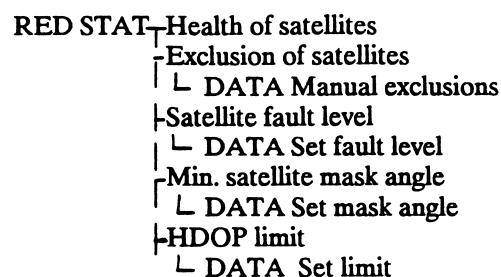
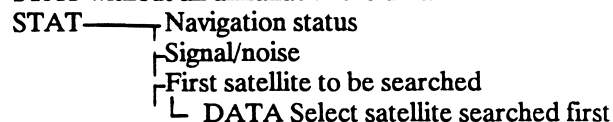
The following is an overview of the various function groups. There is an alphabetical list of the functions on page 9.



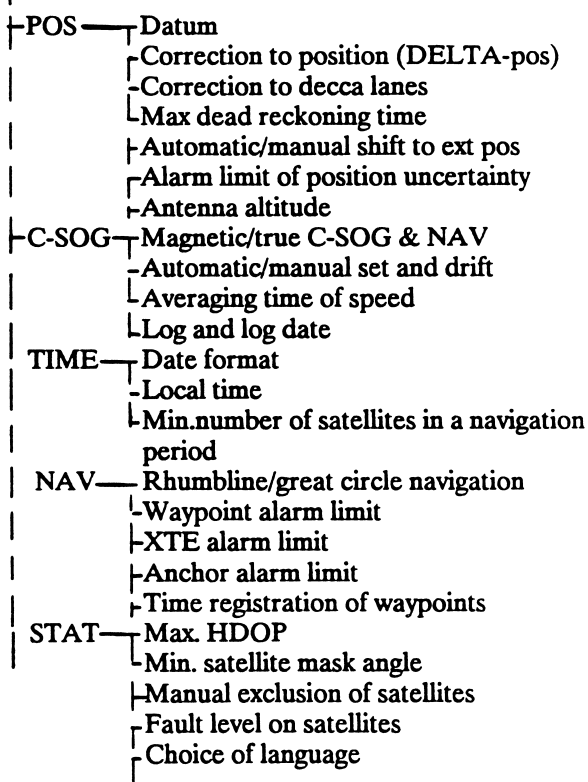
STAT with an almanac in the unit:



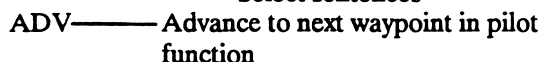
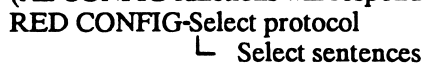
STAT without an almanac in the unit:



#### CONFIG



(All CONFIG functions will respond on DATA)





## Alphabetical list of the functions:

Function	Key
Alarm limit for pos uncertainty	CONFIG POS
Anchor alarm	NAV CONFIG NAV
Anchor position	NAV
Antenna altitude	CONFIG POS
Averaging time of speed	CONFIG C-SOG
Calculated set and drift	RED C-SOG
Corrected position	RED POS
Course and speed over ground	C-SOG
Date format	CONFIG TIME
Datum	CONFIG POS
Dead reckoning time	CONFIG POS
Decca chain, name	POS
Decca lanes	POS
Destination waypoint	NAV
Editing of route	ROUTE
ETA	RED NAV
Exclusion of satellittes	CONFIG STAT
External course and speed	RED C-SOG
External position	RED POS
First satellite to be searched	STAT
GPS position	RED POS
Great circle navigation	CONFIG NAV
HDOP Max	CONFIG STAT
Language, choice of	CONFIG STAT
Log and log date	C-SOG CONFIG C-SOG
Local time and date	TIME CONFIG TIME
Min satellite mask angle	CONFIG STAT
Navigation periods	RED TIME
Navigation satellittes	STAT
Navigation status	STAT
Next waypoint in sailplan	ADV
NMEA Setup	RED CONFIG
Number of sats in nav period	CONFIG TIME
Pilot function	NAV
Position	POS
Position offset	CONFIG POS
Rhumblines navigation	CONFIG NAV
Route, set up and edit	ROUTE
Route calculations	RED ROUTE
Sailing direction in route	NAV
Satellite exclusion	RED STAT
Satellite fault level	RED STAT
Satellite mask angle	STAT
Satellite warning	CONFIG STAT
Set and drift aut/man	CONFIG C-SOG
Signal/noise	STAT
Speed	RED NAV
UTC time	TIME
Variation	RED C-SOG
Visible satellittes	STAT
Waypoint alarm	NAV CONFIG NAV

Waypoint position  
Waypoint, set up and edit  
XTE alarm

NAV  
ROUTE  
NAV  
CONFIG NAV

**2.5 How to insert new data**

You can insert new data or edit existing data in the navigator by following this procedure:

- Press DATA
- Key in the new data
- Press DATA again.

When pressing DATA the character ready to receive a correction will be flashing.

If you don't need to change all the characters in the display, press → to move the cursor to the character you wish to change. If you go too far, you can move backwards by pressing RED ←.

If you make a wrong key entry, press CLEAR or go back with ← and redo the entry.

There are data which can be changed by means of the toggle key. As for instance in the alarm displays, where you can switch between ON and OFF by following this procedure:

- DATA
- TOGGLE
- DATA

*NOTE! Ordinarily when entering data at the cursor position, the cursor will automatically move to the next changeable character. This does not apply for changes made with the TOGGLE key.*

---

### **3. Position, course, speed and time**

---

<b>3.1 About the position in general . . . . .</b>	<b>.11</b>
<b>3.2 Position display . . . . .</b>	<b>.11</b>
<b>3.3 Position possibilities . . . . .</b>	<b>.11</b>
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<b>3.7 GPS Navigation periods . . . . .</b>	<b>.12</b>
<b>3.8 Position in decca lanes . . . . .</b>	<b>.12</b>
<b>3.9 Correction of decca position . . . . .</b>	<b>.13</b>



### 3.1 About the position in general

In a GPS navigation period RS5300C will navigate according to the GPS satellites.

In the periods immediate after GPS navigation RS5300C will navigate according to dead reckoning. However, this will require course and speed input from a connected navigator or from log and compass via interface box.

For how long the navigation should continue on dead reckoning can be set up in CONFIG POS (0-999 minutes).

After the dead reckoning time has run out and there is still no GPS coverage, the navigation can continue via an externally connected navigator.

Automatic shift to external navigator can be set up in CONFIG POS.

### 3.2 Position display

- Press POS

The display shows the position, but no corrections can be made at this point.

GPS	56 52. 735	N
4 A	9 45. 438	E

--	--	--

The shown position is the one used by the navigator for all the computations, and it could be either GPS, COR or EXT. (See section 3.3)

The figure just below G in GPS indicates the number of navigational satellites.

Just to the right of the figure is a letter, which indicates how good the position is at that moment:

- A= Good
- B= Fair
- C= Usable
- 0= Unusable

*For positions shown in decca lanes; see section 3.8.*

### 3.3 Position possibilities

- Press RED, POS

The following can be shown on display:

- GPS = The position is computed according to the satellite data and the inserted datum.
- COR = Offset position. On some charts is indicated a correction to the position from the satellite navigation system, i.e. WGS72 and WGS 84. If using such a chart, make sure to insert the offset in CONFIG.
- EXT = External position. If there are no satellites visible the navigation can be continued from a connected navigator. The display

will tell you from which type of navigator the position is obtained:

- DE = Decca
- LC = LoranC
- TR = Transit

A position from RS4000C will typically look like this display:

EXT	56 52. 735	N
DE A	9 45. 438	E

--	--	--

A indicates that the position is transferred automatically from the connected navigator. An 0 would mean that no external position is used. (Set up in CONFIG)

### 3.4 Course and speed over ground, log

- Press C-SOG

The display will show course and speed over ground in degrees and knot calculated as a direct measure of speed according to the satellites.

M (medium) is the value of the speed filter. It can be altered in CONFIG.

GPS	COG	210DEG
M	SOG	12.3 KN

--	--	--

If there is no GPS coverage RS5300C will take the course and speed rating from the connected navigator. The transferred data will be displayed.

If the connected navigator is an RS5100 Transit satellite navigator the display will show:

EXT	HDG	210DEG
TR	WSP	12.3 KN

--	--	--

Display indications:

- TR = Transit navigator (as for position)
- HDG = Heading
- WSP = Speed through water
- MAG = Course transferred from magnetic compass

- Press the arrow key

The display will show the log, which will contain the distance over ground as it is computed as a position offset.

LOG	5472.8NM
2	NOV 1989

--

Press DATA twice to reset the log. The date in the display shows the last time the log was reset.

### 3.5 Set and drift, external course and speed

- Press RED, C-SOG

The display will show the calculated set and drift in degrees and knot:

SET & DRIFT	AUT
124DEG	4.5KN

--

AUT = Automatically calculated set and drift.

MAN = Manually inserted set and drift.

If you choose to insert the set and drift yourself, select MAN. You can toggle between automatic and manual in CONFIG.

External course and speed:

Press the arrow key and the display will show external course and speed. (See the display shown in section 3.4)

### 3.6 Local time and UTC time

- Press TIME.

The display will show local time and date. If you need to make a correction, press DATA, enter correct time and date, DATA.

Press the arrow key. The display will show UTC time:

UTC	12:50
2	NOV 1989

--

If you need to make a correction, press DATA, enter correct UTC time, DATA.

*NOTE! A correction like this will trig the navigator to perform a new start-up procedure.*

### 3.7 GPS navigation periods

- Press RED, TIME

The display will show the navigation periods; meaning the periods where there is sufficient satellite coverage for navigation:

3	P1	11.27	17.23
	P2	20.24	23.08

--

The figure 3 prior to P1, which is the first period, indicates that there's at least 3 visible satellites in this period.

By pressing the arrow key you can leaf through the list of navigation periods available.

How many visible satellites should minimum be shown in a navigation period can be set up in CONFIG. The system will accept any number between 1 and 9, although 3 is recommended. The whole GPS system is kind of built up around having at least 3 visible satellites in a constellation.

### 3.8 Position shown in decca lanes

- Press POS, arrow key

When using this function for the first time, the system will ask for a chain number. Insert the number e.g. chain 16, press:

DATA, 1, 6, DATA

The display now shows the position in decca lanes.

GPS	RA 7.02
G C 38.65	PA 63.28

--

R, G, P = RED, GREEN and PURPLE chains.

The letter situated between chain and number, indicates the zone number.

If you press the arrow key now, you will see what chain number the position is computed from and if a correction is inserted for the decca position.

*Note! The decca position is converted directly from the GPS position without correction to local conditions regarding the range of radio waves.*



*To obtain the most accurate decca position, the position must be offset by a point with a known decca position e.g. a buoy. And further, the GPS navigator's Datum must be set according to the Datum used to measure the selected decca transmitter's position. (If at all in doubt about this Datum, ask the local authorities).*

### 3.9 Correction of decca position

Place the ship at a point with a known decca position.

The GPS position should be indicated as A i.e. the position is good. (See section 3.2).

Read the navigator's decca position e.g.

R A 7.02, G C 38.65, P A 63.28

If there is any difference between the known decca position and the navigator's decca position, this difference shall be inserted as a position offset.

Example:

The known decca position is: R A 7.25

The navigator's decca position is: R A 7.02

The position offset is: + 0.23

Make this calculation for both R, G and P.

● Press CONFIG, POS, arrow key, arrow key.

Insert the offset by pressing:

● DATA, offset for R, offset for G, offset for P, DATA.

If the offset is in negative, change from + to - by means of the TOGGLE key.

This position offset will thus be valid in a certain area around the point where it was calculated and inserted. Exactly how large an area it will cover is hard to say, and is more a matter of experience.

---

## 4. Routes, waypoints and navigation

---

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#### 4.1 Routes in general

A route consist of a number of waypoints. The memory can store up to 10 routes numbered from 1 to 10. (Route 0 is reserved for Man Overboard). The waypoint capacity is 200 with a maximum of 99 waypoints in one route.

*Select the route function when you want to create new routes/waypoints and to make corrections.*

*Select NAV function when you want to sail on a pre-planned route.*

#### 4.2 How to create a route

Use this function to create new routes and waypoints and to make changes in existing ones.

- Press ROUTE

Select a number for the route, say 01, press:

- DATA, 0 1, DATA

01P	***.***N
01	***.***E

Route	Edit	Mode
Exit :	CLEAR	

Display A: 01 in the top line indicates the routes number. 01 in the bottom line indicates the waypoints number.

Display P: You can tell you are in the route function and you are able to edit. Press CLEAR to exit.

How to insert a position (57°34.000N, 009°42.000E) in Waypoint 01:

- DATA, arrow key, 5 7 3 4 0 0 0,  
arrow key 0 0 9 4 2 0 0 0, DATA.

Switch between N/S and E/W with TOGGLE.

If you are editing and you don't have to change all the figures, the cursor can be moved around by means of the arrow key or RED, arrow key.

*NOTE! The P after the route's number will change to an A when pressing DATA after entering the position. This means that the waypoint is active.*

(See section 4.5.)

01A	5734.000N
01	942.000E

Route	Edit	Mode
Exit :	CLEAR	

The first waypoint is inserted. If you want to insert a second one, press the arrow key and repeat the procedure.

When you have entered the required waypoints for the route, press CLEAR to exit the function.

The display will show:

Leave route open for WPLOT : NO
------------------------------------

Route	Edit	Mode
Exit :	CLEAR	

Display A: Toggle between NO and YES by pressing DATA, TOGGLE, DATA.

NO = Route is completed and closed.

YES = Route is open and you can insert new waypoints while sailing by means of WPLOT.

(See section 4.3)

#### 4.3 How to insert waypoints while sailing

You can enter the ships position as a waypoint while sailing. This is done with WPLOT.

Select a route, press:

- ROUTE, DATA, enter routes number, DATA.

You can select a route with waypoints or an empty route. If you choose a route with waypoints in it, a WPLOT will insert the new waypoint right on the waypoint number displayed at the time and move the rest of the waypoints in the route further down in the list. They will all be getting higher numbers, then. If you don't want the waypoints in the route to be all mixed up, make sure the waypoint in the display is where you want to insert the ships position with WPLOT.

- Press CLEAR, select YES with DATA, TOGGLE, DATA. Press CLEAR to exit.

You will now have returned to the display that was on prior to selecting the route function.

When you pass an interesting position, press

- WPLOT

WP No 04 PLOTTET TO ROUTE No 01
------------------------------------

UTC	12:25
3 DEC	1989

Everytime you press WPLOT the display will show a new waypoint is inserted. Press any function key to restore original display.

When you don't want to insert any more waypoints with WPLOT, select ROUTE and close the route by pressing CLEAR, CLEAR.

#### 4.4 Route 10

Route 10 is a special route, because it stores all your waypoints made with WPLOT. No matter what display is active when you press WPLOT, the waypoint data will still go in route 10 (except when navigating by route 10).

When pressing WPLOT the new waypoint will be entered as the first empty waypoint in route 10, and when you reach waypoint 99, the navigator will go back and overwrite waypoint 1, then no. 2 and so on. Route 10 has capacity for 99 waypoints, which can be used for navigation via the NAV menu. Refer to section 4.8 Pilot function.

- Press: WPLOT

WP No 17 plotted
to route No 10

GPS 56 52. 793 N
A 4 9 50. 273 E

#### Time registration of waypoints

This function can be very useful for fishermen who are setting out their nets every day and plots their waypoints in route 10 as they go along. The next day when they are returning to the nets to pull in the catch, the navigator will show the first of the registered waypoints plotted the day before and all they have to do is follow the waypoints.

Each waypoint entered in route 10 is time registered. In CONFIG you can set up for how long you wish the waypoint to be valid.

- Press CONFIG, NAV, repeat arrow key until the display shows:

MAX WAYPOINT AGE
36 HOURS

SYSTEM SETUP
Exit: CLEAR

Set the waypoint's lifetime by pressing:

- DATA, enter the time, DATA

The lifetime can be set from 1 to 999 hours. If the time is left at 0 hours, means that route 10 will function as any other route in the navigator.

When the set lifetime has expired, the waypoint will be obsolete, and the system will automatically start the navigation at the last valid waypoint when navigating in NAV. Any other waypoint has to be selected manually.

#### 4.5 Waypoints

When selecting a waypoint there will always be a letter indication prior to the position.

The letter can be changed manually by pressing DATA, (letter is flashing), TOGGLE.

The letters can be:

- A = Active waypoint. It is part of the route and will be used in navigation.
- P = Passive waypoint. It is not part of the route and will not be used in navigation.
- I = Insert a new waypoint right on this number. Standard procedure is applied to enter WP which will move the rest of the WPs one number on the list.
- D = Delete waypoint. The waypoint on this number will be deleted which will move the rest of the WP's one number on the list.

Complete entry with DATA.

#### 4.6 Route computations

When you wish to know the range and time to the different waypoints in a route before sailing, press:

- RED, ROUTE.

ROUTE ** WP **
SOG **.*KN

- Press DATA, enter route's number, start-point, speed over ground, DATA.

Example: Route 1, Waypoint 1 and speed over ground 15 knot, press

DATA, 0 1 , 0 1, 15, DATA.

The display will show the data for Waypoint 1.

Press the arrow key to obtain range and time to the next waypoint on the route.

Press the arrow key again to continue with the waypoints throughout the route.

WP 02 TIME 4:35
DIST GC 65NM

*NOTE! If you press RED, arrow key, and go backwards in the route, the navigator will add this to the calculation of range and time.*

Exit this function by pressing a function key, e.g.POS



#### 4.7 Navigation

The navigation function group contains:

- Pilot function
- Position of approached waypoint
- Waypoint alarm
- XTE alarm (cross track error between two waypoints).
- Anchor alarm.

Switch between functions by means of the arrow key or RED, arrow key.

#### 4.8 Pilot function

This function will help you to find the shortest way (great circle navigation only) between two waypoints and will provide continuous steering information.

- Press NAV

Enter the route's number + if you wish to sail the route in forward or reverse direction + the start-point. Example: Route 1, forward direction, start-point is Waypoint 1.

- Press DATA, 0 1, arrow key, 0 1, DATA
- Switch between forward (FWD) and reverse (REV) direction with the TOGGLE key.

The pilot display will be shown after completing the entry:

01 F	-----	< 0.01
01	B: 270	D: 1

--

- Display A: 01 F in the top line indicates you are sailing forward in Route 1.
- The dashes indicates if you are staying on your course and how far (nautical miles) from the ideal course line you are.
- 01 in the bottom line indicates you are sailing towards Waypoint 1.
- B and D indicates course and distance from ship to Waypoint 1

When ready to advance to next waypoint, press:

- ADV

The display will show the position of the next active waypoint in the route and to get the pilot display, press:

- NAV

Press the arrow key and you will have the position of the waypoint you are approaching, press again for course and distance to subsequent waypoint. Return to the pilot display by pressing RED + arrow key, or press the arrow key repeatedly, or just press NAV.

*NOTE! No changes can be made to a route whilst it is used for navigation.*

#### 4.9 How to exit the pilot function

You can exit the pilot function in two ways.

1. After going through the route with ADV, NAV the navigation function will automatically be turned off when reaching the destination waypoint.
2. If you wish to discontinue the navigation before the route is completed, then ... when the NAV display is on, press: DATA, TOGGLE, DATA.

#### 4.10 Alarms

The navigator contain alarm functions for waypoints, XTE and anchor alarms. Maximum alarm distance is 9.9 nautical miles.

Enter the alarm functions by pressing:

- NAV, 3 x arrow key.

Set the alarm distance, press:

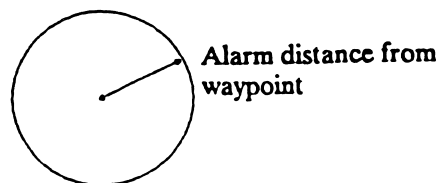
- DATA, TOGGLE, arrow key, insert alarm distance in nautical miles, DATA.

Activate/deactivate the alarm, press:

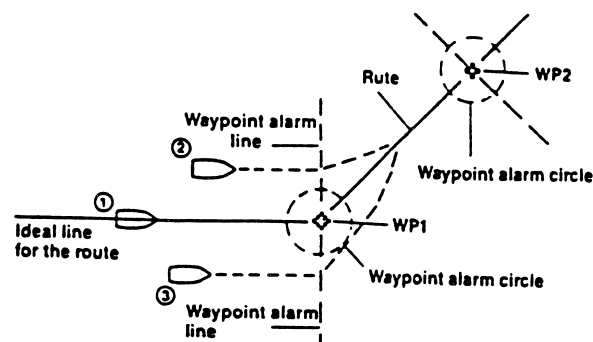
- DATA, TOGGLE, DATA.

**Waypoint alarm:**

Active waypoint alarm forms a circle around the waypoint.



This illustration shows when the alarm will go on.



1.

The ship follows the ideal course line towards Waypoint 1. The alarm will go on at the touch of the circle around the waypoint.

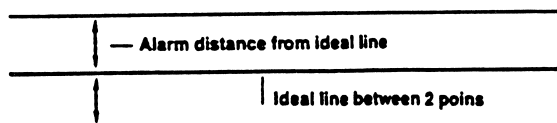
2 and 3.

The ship will not touch the alarm circle, but will cross a line in an angle from the ideal course line. This will cause a waypoint line alarm to go on.

- Press CLEAR or ADV to reset the alarm.

**XTE alarm:**

The set alarm distance indicates how far you will accept to deviate from the ideal course line between two waypoints when you are navigating.

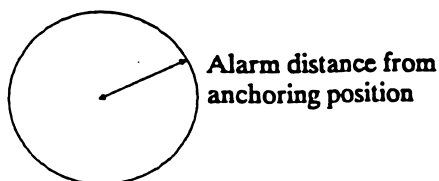


The alarm will go on at the touch of a boundary lane.

- Press CLEAR to reset the alarm.

**Anchor alarm:**

When setting anchor you can set up an anchor alarm. The alarm will go on if you should drift too far away from the anchoring position.



When setting the anchor alarm in ON position the ships position will automatically be registered and a circle is formed around the position. If you should drift outside that circle the alarm will go on.

- Press CLEAR to reset the anchor alarm.
- Press the arrow key to obtain distance and bearing from ships position to anchors position.  
Press the arrow key again to obtain anchors position.  
Press any other key to exit the function.

**4.11 Computed ETA**

This function can inform you of what time you will be arriving at any given waypoint in the route you are sailing on. The time will be local time.

The speed utilized in the computation is the ships speed over ground, but it is also possible to enter the speed manually.

*NOTE! This function is only available if the pilot function is on.*

- Press RED, NAV

If sailing towards Waypoint 2 in a route, the display will show:

ETA WP	02	AUT
16 : 46	6	OCT

--

If you want to know your ETA to Waypoint 6, press:

- DATA, 0 6, DATA.

**Example:**

You want to know your ETA to Waypoint 6 and we set the speed to 12 knot.

- Press DATA
- Press 0 6 (AUT is flashing)
- Press TOGGLE (AUT will change to MAN)
- Press arrow key, enter speed, DATA.

**4.12 Cruising speed**

This function calculates at what speed you will have to cruise to reach a certain waypoint at a certain time from ships position.

*NAV must be ON to use this function.*

- Press RED, NAV, arrow key.

WP **	Available
time	000:00

--

Enter waypoint number and waytime.

Example: Waypoint 6 and 8 hours of waytime, press:

- DATA, 0 6, 0 8, DATA

WP 06	TTG 8:00
ASR	15,3KN

--

TTG = Time to go

ASR = Average speed required

#### 4.13 Speed alarm

Activate the speed alarm when you want the cruising speed not to exceed or go below a certain limit. The feature is very handy for trawl fishing for instance, and to stay below the speed limits in harbours, etc.

Press: ● CONFIG and → until the display shows:

Speed max	0.0KN
Speed min	0.0KN

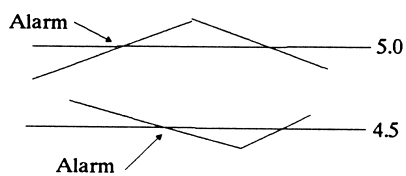
The speed limit can be set in either max or min, or both.

Insert alarm limits by pressing:

● DATA, insert max limit, insert min limit, DATA.

Speed max	5.0KN
Speed min	4.5KN

The alarm will then sound if the cruising speed should pass the 5 knots or fall below the 4.5 knots.



Press **CLEAR** to reset the alarm.

---

## 5. Configuration

---

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### 5.1 CONFIG Configuration in general

Configuration could be interpreted as a kind of library for how RS5300C is set up to perform. By using CONFIG you can leaf through the various objects, check the setup and change it if you like. Some of the objects, say the antenna and the datum, they can only be set up or changed in CONFIG while most of the objects are setable in the individual functions, such as alarms, etc.

There are two ways of locating an object in CONFIG. The first one is:

- Press CONFIG and leaf through all the objects by means of the arrow key.

The second one is:

- Press CONFIG, followed by a function, say POS. This gives you access to all the functions related to the position. Leaf through them by means of the arrow key and continue your way through CONFIG.

On page 8 is a detailed description of the CONFIG function group, where each function is explained one by one in the order in which they appear in CONFIG, or ... since some of the functions are described elsewhere ... there will be a referral to a different function group.

### 5.2 Datum

To obtain a correct position requires that the inserted datum is the same as the one your chart is referring to. Double check if necessary.

Select DATUM in CONFIG, DATA, insert the right number for the datum, DATA.

Press CLEAR to exit CONFIG.

There is a total of 49 datums. Refer to the datum list in section 6.24.

### 5.3 Position offset

Some charts does not indicate a number for the datum, instead they have a position offset, which can be related to a certain datum. If you use such a chart for navigation, you will have to enter the offset into the system to obtain a match between your chart and your navigator.

Select DATA in CONFIG and enter the offset in minutes and bits of minutes.

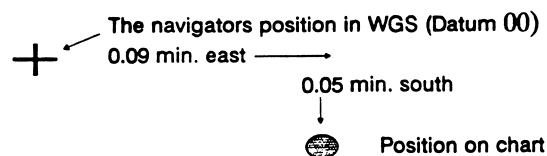
Press CLEAR to exit CONFIG.

When pressing POS the display will show COR position ... for corrected position ... and this is the one you can compare with the chart.

For correction to decca positions, refer to section 3.9.

Example:

A chart may not indicate any Datum, but has this information instead: "Positions received from satellite navigation systems based on World Geodetic System (WGS) needs to be transferred 0.05 minutes to the south and 0.09 minutes to the east in order to match the chart".



- CONFIG, POS, arrow key

DELTA	0.000 N
	0.000 E

SYSTEM SETUP
Exit: CLEAR

Enter the position offset from the chart into the computer:

- DATA, 0, 0, 5, 0, TOGGLE (E/W and N/S), arrow key, 0, 0, 9, 0, DATA

The display will show:

DELTA	0.050 S
	0.090 E

SYSTEM SETUP
Exit: CLEAR

- Press CLEAR to exit CONFIG.
- Press POS

COR	56 52.763 N
A 4	9 50.386 E

--

The POS display will indicate if the position has been corrected (COR).

### 5.4 Max time for dead reckoning

As mentioned in section 3.1 the navigation immediate after a GPS period is always according to dead reckoning. The time, for how long you wish to be sailing according to dead reckoning, can be set to

between 0 and 999 minutes. (It is set to 30 minutes from the factory).

Select DEAD RECKONING in CONFIG, DATA, enter the minutes, DATA.

Press CLEAR to exit CONFIG.

Dead reckoning sailing is indicated on the display as DR.

*NOTE! Navigating according to dead reckoning will require course and speed input from external navigator or from log and compass.*

### 5.5 Switch to external navigator

If an external navigator is connected you can set up the system to use an external position outside GPS navigation periods.

Select automatic shift in CONFIG, DATA, and change from Off to On with TOGGLE, DATA. Press CLEAR to exit CONFIG.

When pressing POS the display will show EXT position during the periods where the external position is being used. It will also indicate what type of navigator the position comes from, like TR will stand for Transit satellite navigator.

### 5.6 Alarm limit for position uncertainty

RS5300C continuously computes the position accuracy, or more precise, the uncertainty on the computed GPS position.

The alarm limit can be set to between 0.1 and 0.9 nautical miles, and of course it can be turned on and off. How large the alarm limit should be is a matter of individual experience. There is no golden rule saying just how much, so it will simply have to be tried out.

Select Pos error alarm in CONFIG, DATA, put the alarm in on or off position by means of the TOGGLE key, insert the alarm limit, DATA. Press CLEAR to exit CONFIG.

The alarm will go on if the uncertainty is exceeded; e.g. when a satellite disappears. Press CLEAR to reset the alarm.

An activated alarm does not affect normal navigation by RS5300C.

### 5.7 Antenna altitude

RS5300C uses the antenna altitude for computations of the position, it is therefore most important that the inserted antenna altitude is correct. By antenna altitude is meant the height above sea-level.

Select Antenna altitude in CONFIG, DATA, insert the height in metres, DATA.

Press CLEAR to exit CONFIG.

### 5.8 True/magnetic readout

This function allows you to toggle between true and magnetic course and bearing in C-SOG and NAV displays. The displays are called forward in CONFIG. Toggle between true and magnetic by pressing DATA, TOGGLE, DATA.

*Note! All other courses/bearings e.g. bearing to visible satellites are always shown in true course/bearing.*

Display indications during navigation are T for true and M for magnetic.

### 5.9 Automatic/manual set and drift

RS5300C will automatically calculate set and drift during normal GPS navigation when log and compass are connected, this may be via RS5100.

The calculated set and drift will be used for dead reckoning navigation outside GPS periods.

However, in waters with a strong and changing current this automatic set and drift may become invalid due to change of current post calculations.

Instead you will need to enter a "manual" set and drift.

Select Set and drift in CONFIG, DATA, switch to manual with TOGGLE, DATA.

Press DATA one more time, enter set and drift in degrees and knot, DATA.

Press CLEAR to exit CONFIG.

*NOTE! Remember to return set and drift to Automatic calculation again.*

### 5.10 Speed filter

The speed filter decides how quickly the navigator reacts to a change of speed.

The filter can be set to:

SLOW	about 3 minutes
MEDIUM	about 40 seconds
FAST	about 20 seconds

Select Speed filter in CONFIG, DATA, switch with TOGGLE, DATA. Press CLEAR to exit CONFIG.

Do not select FAST in rough seas, where the antenna will be swinging a lot.

### 5.11 Log and log date

The built-in log shows distance over ground and is calculated according to the position offset.

To reset log:

Select LOG in CONFIG, DATA, DATA.

The data on the display will be altered at the same time and will show today's date.

#### 5.12 Date format

There is a choice of having the date shown in American style or European style.

Select DATE FORMAT in CONFIG, DATA, change with TOGGLE, DATA. Press CLEAR to exit CONFIG.

#### 5.13 Setting of local time and date

Local time can be inserted and shown. However, if it is more than 12 hours different from the UTC time, it will be rejected.

Select LOCAL in CONFIG, DATA, insert the local time and maybe also the date, DATA. Press CLEAR to exit CONFIG.

The inserted time will automatically be adjusted to show the difference from UTC time in a number of half hours.

#### 5.14 Min. number of satellites in a period

The GPS navigator will in principle only navigate when at least 3 satellites are visible.

The standard value for computations of navigation periods is therefore 3, but it could be changed to anywhere between 1 and 9 satellites.

- If setting the value to 1, it will reveal if there are any visible satellites at all.
- If leaving the value at 3, you will receive information of navigation periods with 2 dimensional coverage.
- If setting the value to 4, you will receive information of navigation periods with 3 dimensional coverage.

Select MIN NO OF SATS in CONFIG, DATA, select the number of satellites you want, by means of TOGGLE, DATA. Press CLEAR to exit CONFIG.

#### 5.15 Rhumbline or great circle navigation

It is here decided whether to calculate bearing and range according to rhumbline or great circle.

Select NAVIGATION MODE in CONFIG, DATA switch between the two possibilities with TOGGLE, DATA. Press CLEAR to exit CONFIG.

#### 5.16 Alarm limit for waypoints

Alarm for arriving at waypoint can be set on/off and the limit can be set in nautical miles.

Select WP ALARM in CONFIG, DATA, set the alarm on/off with TOGGLE, press the arrow key, insert the limit in nautical miles, DATA. Press CLEAR to exit CONFIG.

#### 5.17 Alarm limit for XTE

The alarm limit for cross track error between two waypoints (XTE) can be set on/off and the limit can be set in nautical miles.

Select XTE ALARM in CONFIG, DATA, set the alarm on/off with TOGGLE, press the arrow key, insert the limit in nautical miles, DATA. Press CLEAR to exit CONFIG.

#### 5.18 Anchor alarm

Alarm for anchor drift can be set on/off and the distance can be set in nautical miles.

Select ANCHOR ALARM in CONFIG, DATA, set the alarm on/off with TOGGLE, press the arrow key, insert the limit in nautical miles, DATA. Press CLEAR to exit CONFIG.

#### 5.19 Time registration of waypoints

Refer to section 4.4. Route 10.

#### 5.20 Maximum HDOP

The maximum value of HDOP is changeable, although the recommended value is 8. The value should *never* be set to 20 or more. Navigation with such poor satellite geometry would only create a large uncertainty on the position.

Select MAX HDOP in CONFIG, DATA, insert the value, DATA. Press CLEAR to exit CONFIG.

#### 5.21 Minimum satellite angle

This is the minimum angle above the horizon where the satellite shall be used for navigation. Satellites with a lesser angle are excluded.

Select SATELLITE MASK ANGLE in CONFIG, DATA, insert angle in degrees, DATA. Press CLEAR to exit CONFIG.

#### 5.22 Exclusion of satellites

You can manually exclude any of the satellites if you doubt their health.

Select the display showing the satellite status in CONFIG, DATA. Switch between yes/no with TOGGLE, press the arrow key, insert the number on the satellite you want excluded, DATA.  
Press CLEAR to exit CONFIG.

#### 5.23 Satellite warning

The data received from a satellite could include a warning message directly from the satellite. The navigator will not use a satellite with a warning flag, but ... you may want to neglect the warning and force the navigator to use the satellite anyway.  
Select NEGLECT SAT. WARNING in CONFIG, DATA, switch between yes/no with TOGGLE, DATA.

#### 5.24 Choice of language

In this menu you can select which language you prefer to use in the display text.

Select: Language in CONFIG, DATA, choose your language with TOGGLE, DATA.

Press CLEAR to exit CONFIG.



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## 6. Installation

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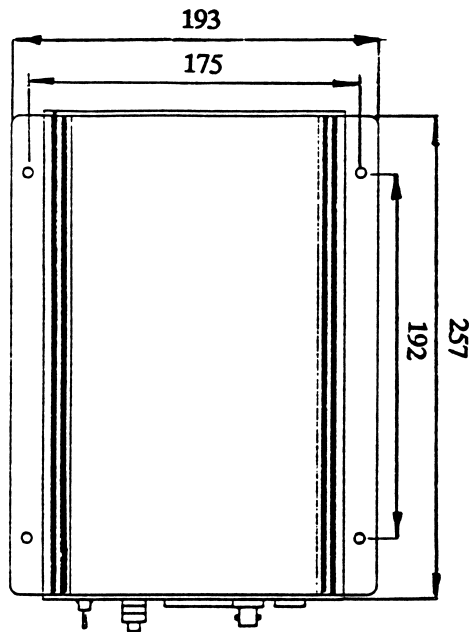
### 6.1 Mounting of mechanical parts

RS5300C can be mounted on table, wall or in the ceiling.

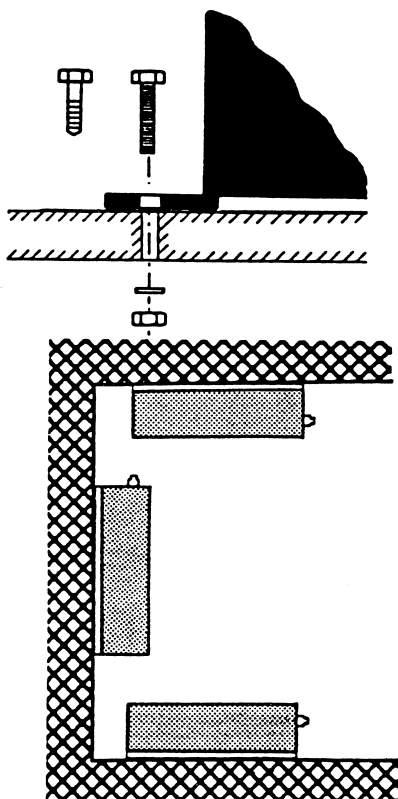
RS5310 is delivered with a bracket for table or wall mounting.

### 6.2 Mounting of RS5300C

Secure the unit with the four bolts or wood screws included. The drawing below is the RS5300C from the top (measurements are in mm).



If using the bolts; rough-drill a 7 mm hole.  
If using the wood screws; rough-drill a 3.5 mm hole.  
Maximum thickness of plate: 25 mm.  
Below drawing is RS5300C from the front.

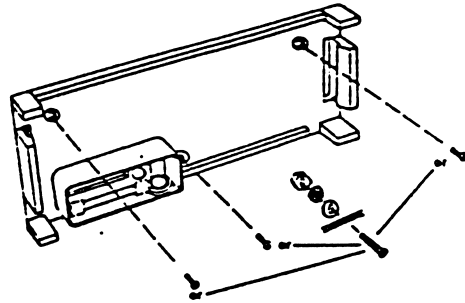


### 6.3 Mounting of RS5310

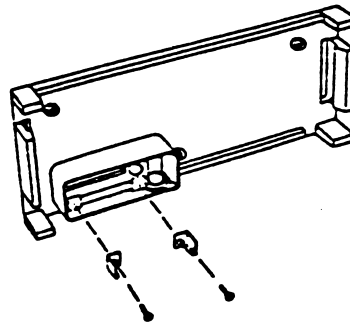
RS5310 is delivered with mounting bracket, a 12 pin multiplug, a terminal strip, 5 metres of special multi cable and various screws for mounting.

The mounting bracket is fastened with 3 screws. The multi cable can be led under or behind the unit. The non-used hole can be sealed with the blind screw to make the unit watertight.

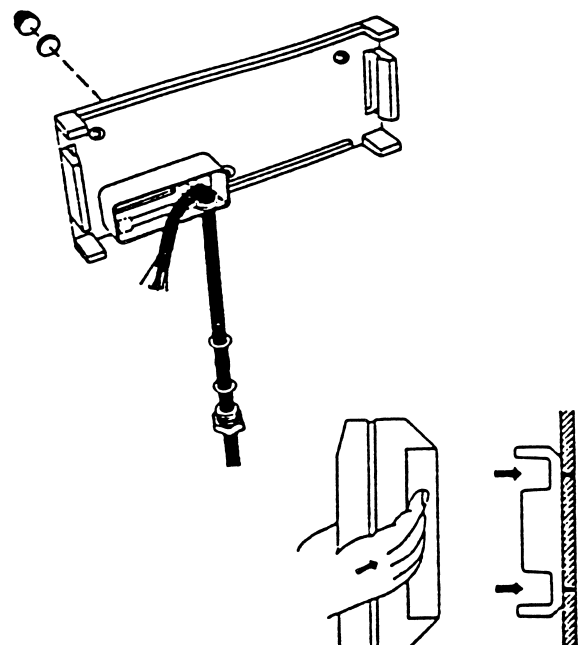
If the multi cable is led behind the unit; drill a 20 mm hole in the bulkhead for the cable to go through



Fasten the two retainers with screws in the plug holder to hold the 12-pin plug in position.



Lead the multi cable through the bypass, the two retaining rings and the rubber gasket and then up through the plug holder. Strip the cable. There are 6 wires and a coax shield.



Connect the wires to the 12 pin plug.

Terminal number:	Wire colour:
12	Pink
11	Grey
10	External MOB switch
9	Brown
8	White
7	Green
6	Yellow
5	GND for MOB switch
4	NC
3	Alarm switch
2	Max 1A
1	Coax shield

Pull about 5 mm of cable back into the plug holder. Tighten the bypass and push the plug into its place in the holder with a screwdriver.

Insert the control unit in the mounting bracket by pressing the snap locks while guiding the unit into place.

At the other end of the multi cable is a 9 pin connector, which should be connected to RS5300C in the CONTROL port.

#### 6.4 Power supply

**Warning!**

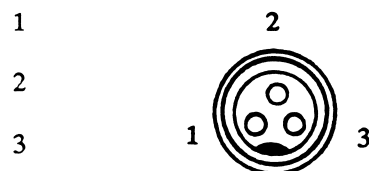
Incorrect hook-up.

Maximum voltage is 43 V dc. The use of higher voltage will require a converter (optional).

We like to bring to your attention, that power supplies of 32 + V dc very often will transmit a voltage higher than 43 V dc, and this requires a converter. RS5300C is protected against reversed polarity.

Use the power cable in the package to connect RS5300C to the power supply. An extension for the power cable should be of exact same type cable.

Power plug:

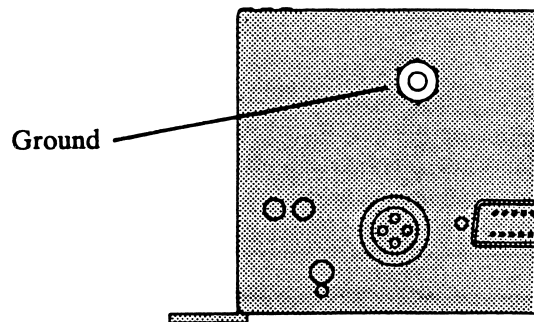


Pin

- 1 + (Battery +)
- 2 Not connected
- 3 Ground (Battery-)

#### 6.5 Ground

RS5300C is grounded through the ground bolt (M6 stainless steel) situated on the navigator's front.



#### 6.6 Installation of antenna

Where to install the antenna is of utmost importance if the RS5300C is to function satisfactorily. And this especially if navigating on satellites, as they are transmitting on very high frequencies.

A kind of "Eye contact" is therefore needed from antenna to satellite during the whole time the satellite stays over the horizon.

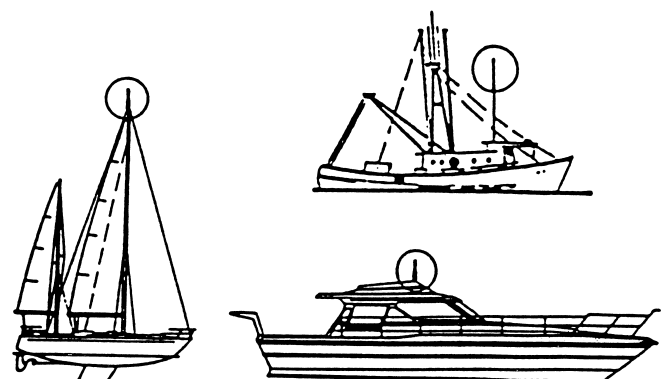
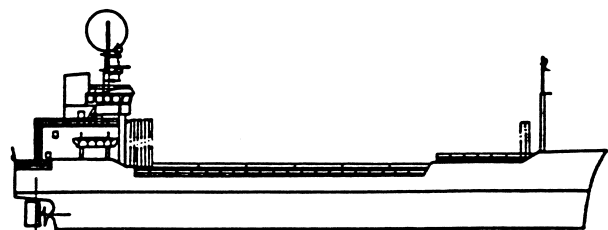
The antenna shall be placed as high up as possible and in a place where tall constructions, steel wires, masts, etc does not obstruct the view to the satellite. Also, do not place the antenna close to electrical interferences, such as radar, etc.

Best place for installation on sailboats is the top of the mast. On motorboats it is the highest spot on the roof of the cabin.

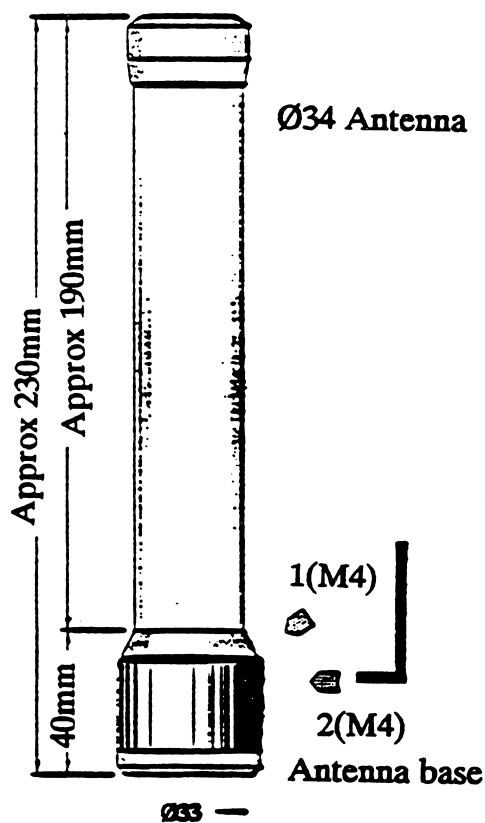
Installing the antenna on the roof of a cabin will require a steel pipe of at least half a metre long below the antenna.

The package includes the cable plugs needed, but no antenna cable. Use cable type RG213/U for the installation.

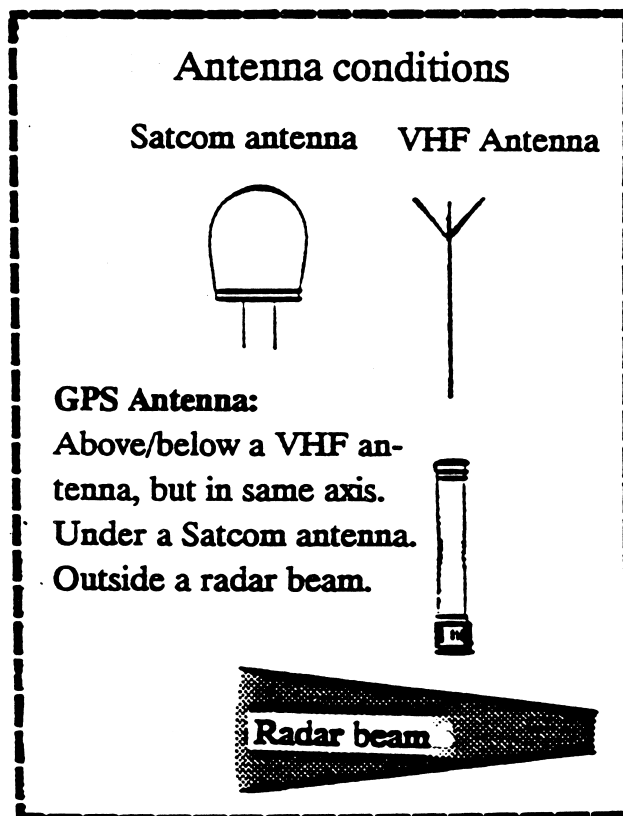
Maximum cable length allowed is 30 metres.



## RS5640 GPS Antenna



The antenna can be mounted on a Ø33mm pipe



### GPS Antenna:

Above/below a VHF antenna, but in same axis.  
Under a Satcom antenna.  
Outside a radar beam.

**Mounting of cable:**  
Loosen the Allen screw 1 (M4) and unscrew the antenna base. Lead the cable through the antenna base and screw the antenna socket into the antenna. Screw the antenna base back on and lock it with the Allen screw 1.  
*NB! Do not attempt to dismantle the antenna further.*

**Mounting on pipe:**  
Loosen the two Allen screws marked 2 (M4). Place the antenna base over the top of the pipe and fasten the two Allen screws again.

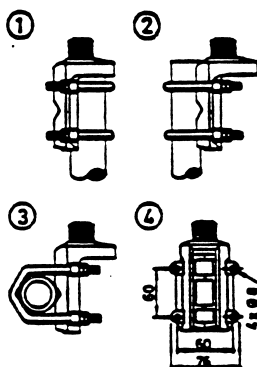
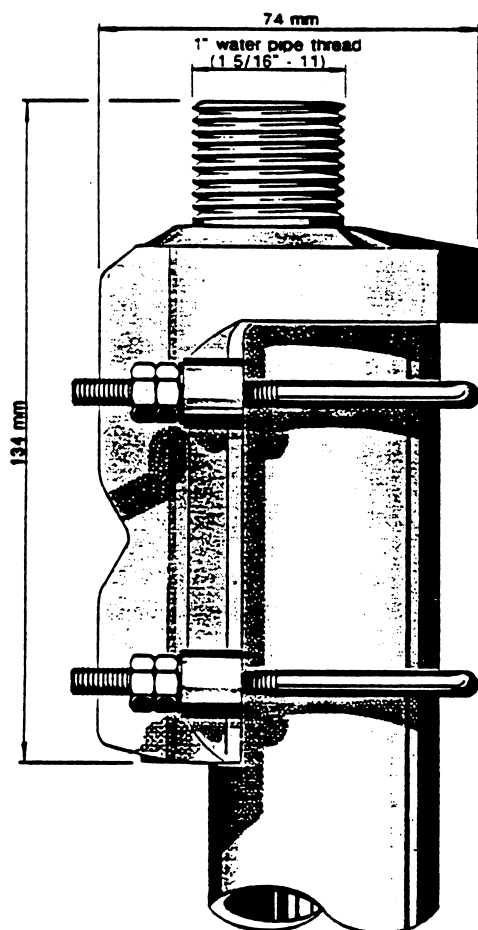
Antenna end  
FME socket

Antenna cable  
10m RG58  
Standard

Receiver end  
BNC socket



### Antenna bracket LW-1" (Option)



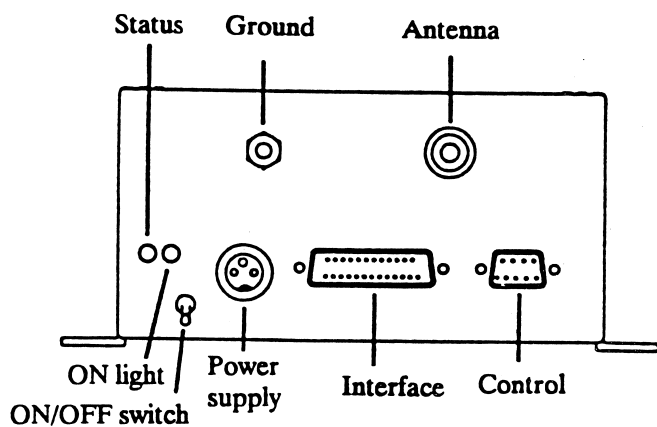
1. Pipe Di, min = 30mm  
Pipe Do, min = 54mm
2. Pipe Do, max = 54mm  
Pipe Do, min = 16mm
3. Pipe Do, max = 54mm  
Pipe Do, min = 16mm

Di = Inside diameter  
Do = Outside diameter

#### Mounting on bracket:

The antenna is mounted on a bracket the same way as it is mounted on a pipe (Refer to previous page).

### 6.7 RS5300C connection plugs



#### How to read the Status light:

##### *Steady light:*

Normal updating of position.

##### *Light is flashing in intervals of 2.5 seconds:*

Number of flashes indicates the number of satellites the navigator is locked on to and receiving data from.

##### *Light is flashing every 5 seconds:*

The navigator contains an almanac, but has no contact with any satellites.

##### *Light is flashing every 10 seconds:*

The navigator contains no almanac, and has no contact with any satellites.



**6.8 NMEA in general**

Use the Interface port in the front for connection of optional equipment.

Choose between NMEA 0180 simple, NMEA 0180 complex, NMEA 0183, printer or FURUNO.

Pin

25	Send data
13	Send return
12	Receive return
24	Receive data

**The following data can be transmitted:**

*Either*

**NMEA 0180**      Simple  
                         Complex

with free time intervals between strings.

*or*

**NMEA 0183**

*AAM* Implemented according to updating A in January 1989.

*APA* All fields are according to standard.

*BOD* True bearing and variation to approaching waypoint, computed from last sailed waypoint.

*BWC/R* Automatic switch between BWC and BWR when the navigation computation switches between great circle and rhumbline.. True bearing and variation are transmitted.

*BWW* Course from approaching and subsequent waypoint.

*GGA* All fields are according to standard.

*GLL* Choice of 2 or 3 decimals in minutes, with 2 as standard.

*SNC* All fields are according to standard.

*SNU* Valid (A) is transmitted when the GPS position is being updated, also when updating in dead reckoning, else invalid (I) is transmitted.

*VHW* A received VHW string can be retransmitted, but the GPS does not generate any VHW strings.

*VTG* fields 7 and 8 are not completed.

*WNC/R* Switch between WNC and WNR as described for BWC/R. The sentence always indicates the distance from next waypoint to subsequent active waypoint in the route. Fields 3 and 4 are not completed.

*XTE/R* Automatic switch between XTE and XTR depending if the position is being updated continually or is based on dead reckoning.

**NB!** External decca transmits XTE and Transit transmits XTR.

*ZDA* Field 5 is not completed.

*ZTG*

Sender ID can be changed GP → DE/LC/TR and MP.

*A general rule for all sentences:*

Fields are not completed if associated values are not valid.

*or*

**Printer**

1200 baud, 7 data bit, 1 stop bit, even parity.

Print-outs of position, course and speed, and UTC displays can be set up separately in time intervals of 1-99 minutes.

The function RED - RED 5 will print out position, course and speed, and UTC display, (no previous settings required), all you need is to select the printer protocol first.

*or*

**FURUNO**

4800 baud, 7 data bit, 2 stop bit, even parity.

Output format is adjusted to FURUNO, model FP-170 and GD-120.

**The following data can be received:**

(depending upon the selected protocol)

**NMEA 0180 complex**

Decode the position from NMEA 0180 complex if this string is received. The sender of a complex string will typically get an MP (microwave position) identity, since this generic term is used by many systems instead of using specific names. See the list on this page for accepted transmitters.

**NMEA 0183**

Decode GLL strings, where sender ID is DE, TR, LC, GP, MP or II.

VTG and VHW strings are decoded if the sender is DE, TR, LC, GP, MP or II.

**Printer**

Choose between data input as described above i.e. NMEA 0183 or NMEA 0180.

**FURUNO**

No data input.

**CONTROL**

4800 baud, 8 data bit, 1 stop bit, no parity.

Transmittable:

Control and display strings for two RS5310 Operation units and one time per second, an NMEA 0183 string in the following sequence: DUAL TRACK, VTG, ZDA, XTE, DUAL TRACK, VTG .....

DUAL TRACK is a standard GLL string (2 decimals) with GPS position ahead to and including the indication of E/W, followed by LYG, external position, valid flags, CRLF. The GPS position will always be completed in the DUAL TRACK string. The external position appearing after LYG will also be completed. Validity of the two positions is indicated by the two flags before CRLF. The GPS position is valid if the position is being updated, and the external position is valid if received within the last 25 seconds by decoding of an 0180 complex or an 0183 string on the Interface port.

**6.9 Connection of RS4000CC/RS4000/RS4200**

NMEA:

RS5300C		RS4000CC	
Interface port		Plug 15	
25 pin SUB-D plug		8 pin CPC plug	
Pin	Colour	Pin	
25	White	8	
13	Brown	7	
12	Green	3	
24	Yellow	4	
Not connected		1, 2, 5, 6	

**6.10 Connection of RS5100**

NMEA:

RS5300C		RS5100	
Interface port		Plug 14	
25 pin SUB-D plug		8 pin CPC plug	
Pin	Colour	Pin	
25	White	8	
13	Brown	7	
12	Green	3	
24	Yellow	4	
Not connected		1, 2, 5, 6	

**6.11 Connection of RS2500**

NMEA:

RS5300C		RS2500	
Interface port		PL2	
25 pin SUB-D plug		Terminal strip	
Pin	Colour	Pin	
25	White	RD + 1	
13	Brown	RR-1	

**6.12 NMEA (Not in this navigator)**

RS5300C			
Interface port			
25 pin SUB-D plug			
Pin			
21	Data 2	NMEA OUT	
9	Return 2	2	
22	Data 2	NMEA IN	
10	Return 2	2	

**6.13 Connection to external log**

RS5300C	
Interface port	
25 pin SUB-D plug	
Pin	
5	
6	
5V pulses 20 mA	
200 pulses per nautical mile	

**6.14 Connection of RS2000**

NMEA:

RS5300C		RS2000	
Interface port		PL3	
25 pin SUB-D plug		9 pin CPC plug	
Pin	Colour	Pin	
25	White	1	
13	Brown	2	
		Not connected 3, 4, 5, 6, 7, 8, 9	

**6.15 Connection of RS4500**

NMEA:

RS5300C		RS4500	
Interface port		Terminal strip	
25 pin SUB-D plug		NMEA IN/OUT	
Pin	Colour	Pin	
25	White	Signal	NMEA IN
13	Brown	Return	1
12	Green	Return	NMEA OUT
24	Yellow	Signal	1

**6.16 Connection of external alarm on RS5310**

An alarm switch is connected to the 12 pin terminal strip between pin 2 and 3. Max. 1A and 60 VDC.

**6.17 Connection of ext. MOB switches on RS5310**

External switches for man overboard is connected to the 12 pin terminal strip between pin 5 and 10. The switches should be connected in parallel.

**6.18 External MOB switches on RS5300C**

External MOB switches can be connected to RS5300C as indicated below:

RS5300C	
Interface port	
Pin	
7	
8	

The switches should be connected in parallel.

**6.19 Connection of printer RS61xx**

The printer is connected on the Interface port.

RS5300C		RS61xx	
Interface port			
Pin		Pin	
25		20	
13		19	

**6.20 NMEA setup**

NMEA should not be set up before all the wires are connected.

- Press RED, CONFIG

SETUP FUNCTIONS  
FOR PORT 1

Red Config Mode  
Exit : CLEAR

- Press the arrow key

COMMUNICATION  
PROTOCOL NMEA183

Red Config Mode  
Exit : CLEAR

Switch between NMEA183, 180 Simple, 180 Complex, FURONO and printer by pressing:

- DATA, TOGGLE Verify with DATA

If selecting NMEA180; press the arrow key again and you'll set the function Simple or Complex in ON position (set the time too) by pressing:

- DATA, TOGGLE, arrow key, set the time, DATA

Switch between Simple and Complex with the arrow key.

If the data format is set to NMEA183; then continue by pressing the arrow key and set the sentences you'll need in ON position (set the time too) by pressing:

- DATA, TOGGLE, arrow key, set the time, DATA

*The correct format for an NMEA 183 sentence is GP. However, older equipment may not be able to read this format and will have to use another.*

*Select between: GP (standard format), MP, DE, LC and TR by pressing:*

- DATA, TOGGLE, DATA

FURONO is selected by pressing DATA when the legend FURONO is displayed.

Printer is selected by pressing DATA when the legend PRINTER is displayed.

You can get a print-out of POS, C-SOG and UTC time from the printer.

You call the item by pressing DATA, TOGGLE, DATA, arrow key, insert the time interval between print-outs, DATA.

When the setup is O.K. Press CLEAR to exit RED, CONFIG.

**6.21 Connection of two RS5310 units**

Two RS5310 units can simultaneously be connected to RS5300C.

The wires can be connected to e.g. a terminal strip as illustrated below.

We strongly recommend to have a technician perform the installation.

RS5310	RS5300C	RS5310
Pin	Port 2 Pin	Pin
9 Brown	1 — Return Out	Brown 9
1 Shield	3 —	Shield 1
6 Yellow	5 — Data In	Yellow 6
8 White	6 — Data Out	White 8
12 Pink	7 — +8V	Pink 12
11 Grey	8 — 0V	Grey 11
7 Green	9 — Return In	Green 7

→| = BAT 85

When the two RS5310's are connected, the RS5300C unit will have to know which unit has priority and which unit is secondary.

This is set up on the switches inside RS5310.

Priority unit 1 : Switch 1, 2,3 and 4 to ON

Secondary unit 2: Switch 1,3,4 to ON, 2 to OFF.

**6.22 Connection of RS2500 as operation unit**

RS2500 can be connected as operation unit or as one of the two operation units.

Cable number 104.0016.006

RS5300C			RS2500
Control port			PL2 eller PL4
Pin	Colour	Name	Terminal
1	Brown	SR-- ←	RR--1
5	Yellow	RD ←	SD +
6	White	SD + →	RD + 1
9	Green	RR →	SR--

Operation control of RS5300C from RS2500 is detailed in RS2500 Navigators manual, section 7.5 GPS control.

**6.23 How to start RS5300C without an almanac**

RS5300C will normally contain an almanac from the factory and initial start up should be as described in section 2.2.

If, for some unknown reason, there is no almanac available the initial start up should be as follows:

- Press the green switch on RS5300C and wait for a few seconds.
- Press any key on RS5310 to activate the unit.

- Press the arrow key

The display will ask for a position, which have to be correct to within 150 km (approx. 80 nautical miles), press:

- DATA, insert latitude, change N/S with TOGGLE, arrow key, insert longitude, change E/W with TOGGLE, DATA.

- Press the arrow key

The display will ask if the user knows the number of a visible satellite. If so, press:

- DATA, insert satellites number, DATA.  
(If you don't know any, continue as described below)

- Press the arrow key

The display will ask for antenna altitude, press:

- DATA, insert antenna altitude in metres, DATA.

- Press the arrow key

The display will ask for a datum, press:

- DATA, insert datum (see datum list), DATA.

RS5300C will start collecting an almanac. This will take about 15 minutes and then it will be ready to start navigating.

**6.24 Datum list**

It is very important that RS5300C gives the position according to the same datum as the chart is referring to, since the position will otherwise be incorrect

Insert the number of the datum the chart says to use

- 00 WGS 84
- 01 European (International) Datum
- 02 North American 1927 (Clarke) Datum
- 03 North American 1927 Datum Alaska and Canada.
- 04 Tokyo (Bessel) Datum
- 05 Australian Geodetic (Australian National)
- 06 Ordnance survey of Great Britain 1936 (AIRY)
- 07 South American-Provisional South American
- 08 South American-Corrego Alegre (International)
- 09 South American-Campo Inchauspe (International)

- 10 South American-Chau Astro (International)
- 11 South American-Yacare (International) \*
- 12 Old Hawaiian (International) Maui \*
- 13 Old Hawaiian (International) Oahu \*
- 14 Old Hawaiian (International) Kauai \*
- 15 Adindan (Clarke 1880)
- 16 ARC 1950 (Clarke 1880)
- 17 Bukit Rimpah (Bessel) \*
- 18 Camp Area Astro (International) \*
- 19 Djakarta (Bessel)
- 20 Geodetic Datum 1949 (International)
- 21 Ghana (WGS 84) \*\*
- 22 Guam 1963 (Clarke 1866)
- 23 G. Segara (Bessel) \*
- 24 G. Serindung (WGS 84) \*\*
- 25 Herat North (International) \*
- 26 Hjorsey 1955 (International)
- 27 Hu-Tzu-Shan (International) \*
- 28 Indian (Everest)
- 29 Ireland 1965 (Modified Everest)
- 30 Kertau-Malayan. Revised triangulation, modified Everest
- 31 Liberia 1964 (Clarke 1880)
- 32 Luzon (Clarke 1866)
- 33 Merchik (Clarke 1880)
- 34 Montjong Lowe (WGS 84) \*\*
- 35 Nigeria-Minna (Clarke 1880)
- 36 Qurnoq (International)
- 37 Qurnoq Datum 1927 (international) Covers the area from Cape Farvel to Cape Alexander.
- 38 Scoresbysund Datum 1952 (international). Covers the area along the coast from approx. 60°N to 75° N.
- 39 Angmassalik Datum 1958 (International) Covers an area around Angmassalik
- 40 Sierra Leone 1960 (WGS 84)
- 41 Tanarieve Observatory 1924 \*
- 42 Timbalai (Bessel)
- 43 Voirol (WGS 84) \*\*
- 44 Special Datum (SD) MGRS related Indian Datum (Everest)
- 45 SD Luzon Special (Clarke 1866)
- 46 SD Tokyo Special (Bessel)
- 47 SD WGS 84 Special
- 48 WGS 72 (WGS 72)
- 49 Swedish Datum (Updated Bessel)
- 50 Finnish Datum

Well measured datums as e.g. number 02 North American 1927 and number 01 European datum: the maximum fault in conversions from WGS84 is 25 metres.

Poor measured datums can result in max faults of several hundred of metres.

\* indicates poor measured datums.

\*\* indicates there is no conversion factor to WGS84  
The position will therefore be shown in WGS84.

---

## 7. Status and special functions

---

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**7.1 About status in general**

- Press STAT and you have the status for the navigator.
- Press RED, STAT and you have the status for the satellite system.

**7.2 Status with almanac**

- Press STAT

The display will show which satellites are currently visible, locked and being used for navigation.

11P	13P	14P	19P
HDOP 4.1		AIP *.*	

--

Display A: The display will show a maximum of four satellites, as this is the max number used for navigation. 11 in the top line indicates that satellite no. 11 is being used. The letter next to the number can be:

- P = Phase lock
- F = Frequency lock
- C = Code lock
- D = Data demodulation

HDOP is an expression of the quality of the satellite geometry and will typically be somewhere between 1.3 and 10, where a low value is considered to be the best. Until the system is fully employed you may see the HDOP value go past 20. (The value of the HDOP limit is set up in CONFIG or RED, STAT)

AIP is an abbreviation of "Action in process" and will inform of what the navigator is doing at the moment e.g. the navigator is about to get hold of a 5th satellite. The indication could show:  
AIP = 3S or 3D, where S stands for searching and D stands for data demodulation.

- Press the arrow key

The display will show signal/ noise conditions for reception of satellite signals.

11	13DB	13	14DB
14	14DB	19	15DB

--

The number 13DB just after the number of the satellite (11) expresses how well the satellite signal is received from each satellite. Preferably the number should be at least 10DB or higher. It can maximum be 15DB.

A satellite can temporarily go below 10DB, which can happen at the time when the satellite comes up and goes down. If all of the satellites occasionally goes below 10DB this could be caused by a faulty antenna installation and should be checked.

- Press the arrow key

The display will show all visible satellites over the angle, which was set up in RED, STAT or CONFIG as the minimum satellite angle.

NO 11	ST 00000
IN 51	BER 288

--

NO11 means satellite number 11.

ST stands for status and the navigator will only use a satellite with all 0's in the row. The only exception is if the first 0 from left is a 1.

*First 0 from left:* Indication will be 0 if there is no warning from the satellite, and 1 if there is a warning. Such a satellite will only be used for navigation if the warning is set up to be neglected in CONFIG.

*Second 0 from left:* Indication will be 0 if there are no signal or data errors in the satellite signal, and 1 if there are any errors.

*Third 0 from left:* Indication will be 1 if the satellite is excluded by the user, otherwise 0.

*Fourth 0 from left:* Indication will be 1 if the search or data demodulation of the satellite is given up, otherwise 0.

*Fifth 0 from left:* Indication will be 1 if the navigators receiver discover a fault in the satellite.

IN shows the satellites angle of inclination.

BER is the bearing to the satellite.

Continue to check the rest of the satellites by means of the arrow key until there are no more satellites.

**7.3 Status without almanac**

- Press STAT

The display will show the status on the navigator. This display indicates there is no almanac available.

NO ALMANAC	
HDOP *.*	AIP *.*

--



AIP will shortly indicate that a search of satellites is in process.

- Press the arrow key

The display will show if the search was successful.

NAVIGATION SATS  
NONE

In this case there were no satellites.

- Press the arrow key

If you know of a particular satellite that should be usable you can enter its number here:

SEARCH SATELLITE  
NO. 00 FIRST

It is an advantage to know the number of a visible satellite, since this function will decrease the time it takes to collect an almac considerably.

- DATA, enter satellite number, DATA.

#### 7.4 RED STAT

- Press RED STAT

The display will indicate if all satellites are available

TOT 10 OK 10  
DE 0 SE 0

TOT is the total number of satellites in orbit.  
OK is the number of satellites available.  
DE is the number of satellites with data error.  
SE is the number of satellites with signal error.

- Press the arrow key

The display will show which satellites are in the GPS system and if any are excluded.

- + + - - + - - + - + +  
+ + - + - - + - - - -

- indicates that this satellite does not exist.

+ indicates that the satellite is available and can be used for navigation.

0 indicates that the satellite is excluded either by the navigator or the user.

To manually exclude a satellite, press:

- DATA, switch to YES with TOGGLE, arrow key, enter the satellites number, DATA.

Display A: Top line to the left starts with PRN1 (satellite no. 1) and ends up with PRN24 in bottom line to the right.

*If you leave this function with the value set to NO it will erase all exclusions.*

- Press the arrow key

This display will ask if you wish to neglect a satellite warning. (The satellite will in some cases transmit a warning message saying that something is wrong. If this warning is neglected the position may be inaccurate. See section 7.2)

NEGLECT SAT.  
WARNING: NO

If you wish to neglect the warning message:

- DATA, change the value to YES with TOGGLE, DATA.

- Press the arrow key

This display allows you to exclude satellites that are below a certain degree over the horizon.

SATELLITE MASK  
ANGLE 5 DEG

Determine the angle by pressing:

- DATA, insert the degrees, DATA.

- Press the arrow key

In this display you can set up the maximum HDOP value. HDOP is a figure which will indicate how much effect an error in the measuring of range to the satellites will have on the users position. The value depends on the satellite constellation. A crowded constellation gives a high and therewith poor

HDOP value, while a scattered constellation gives a low and therewith good HDOP value. The navigation will stop if the HDOP exceeds the inserted value, and will continue when the value has dropped once again.

|          |   |
|----------|---|
| MAX HDOP | 8 |
|----------|---|

|  |
|--|
|  |
|--|

The value can be set up to anywhere between 6 and 99. It is not recommendable to insert a value higher than 20.

- Press DATA, insert the HDOP value, DATA.

### 7.5 Special functions

RS5300C contains a lot of special functions that are all used for testing purposes and is not very interesting to know for the ordinary user. The functions have all been listed in this chapter:

- Press RED, RED, 1.

The display shows the raw satellite measurements. Roll through five buffers by means of the arrow key.

- Press RED, RED, 2.

The display shows time bias and drift. Call up the ionosphere correction by means of the arrow key.

- Press RED, RED, 3.

The display shows data demodulation. Call up the result of the data demodulation by means of the arrow key.

- Press RED, RED, 4.

The display shows a self-test. Activate the self-test with DATA, TOGGLE, DATA. Roll through six test positions by means of the arrow key. The unit will automatically perform a self-test when it is turned on, but you can also activate a self-test manually after the automatic one is completed.

- Press RED, RED, 6.

The display will say: NO FUNCTION.

- Press RED, RED, 7.

The display shows the contents of the RAM circuit. Select addresses and data format with DATA.

- Press RED, RED, 8.

This gives you a MASTER RESET, which will erase the almanac etc.

To activate a MASTER RESET, press DATA, TOGGLE, DATA.

*NOTE! A MASTER RESET will reset all the data in the navigator to factory setup.*

- Press RED, RED, 9.

The display shows the number of the units software version.

### 7.6 Error message

If during testing RS5300C should detect an error in the computer, the system will in a clear language inform you about an error in RAM or PROM.

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